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ABSTRACT

This Project PRISM SourceBook was written for community leaders who wish to increase the awareness of parents about the need for reforming science and mathematics education and what they can do at home and in the schools and communities to work for better science and mathematics education. Resource sheets address 10 important topics for parents in Spanish and English. From the sheets, each of which is presented in a short form and a longer form, parents learn what they can do to help. Three workshops for parents on improving science and mathematics education are outlined. The first focuses on what parents can do at home, and the second concentrates on how parents can interact with the school. The third workshop focuses on parent action in the community. Script boxes and instructions for hands-on experiences are included. A bibliography lists some additional materials, and a resources section lists some of the 100 examples of community participation that Project PRISM has included in a database housed at the National Urban League. (Contains 46 references.) (SLD)

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A SourceBook for Parent and Community Leaders

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Table of Contents

I. Introduction
The Case for Science and Mathematics Education Reform

II. Parents' Roles in Science and Mathematics Education Reform: Creating Awareness and Action

A. How to Gather Parents for Workshops

B. Community Workshop: Session One — At Home

C. Community Workshop: Session Two — At School

D. Community Workshop: Session Three — In the Community

III. Resources

IV. Bibliography

First Edition

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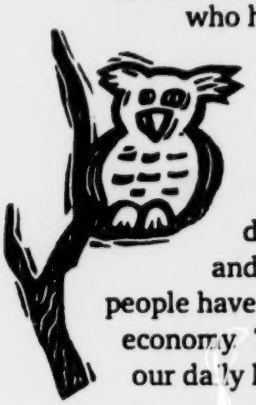
I. Introduction
II. Creating Awareness
A. How to Gather Parents
B. Workshop 1
C. Workshop 2
D. Workshop 3
III. Resources
IV. Bibliography

I. Introduction

I. Introduction

Thousands of people all over the country are working to reform science and math education for all of America's children. The way these subjects have been learned and taught has not successfully reached large numbers of our children, especially those who are African American, Hispanic, or female. Those students who have been reached have often been taught in passive, didactic environments that leave students unprepared for future jobs and unable to use applied science and mathematics in a wise and responsible manner.



Science, mathematics, and technology are a part of every person's daily life. In many ways, they have made our lives more comfortable and the country more productive. On the other hand, some of the ways people have used them have created problems for the environment and the economy. The more all of us understand the influence of science and math on our daily lives, the better off our families, communities, and country will be.

Only when parents join the reform effort will we see significant improvement in the scientific and mathematical literacy of all our children. This SourceBook is written to help parents and parent leaders make use of materials designed to increase awareness of the importance of science and math education for all students and to learn ways to take action at home, in schools, and in their communities.

Why is science and math education so important?

Understanding science and mathematics gives us the power to take control of our lives.

1. It gives us access to jobs. We all want our children to be prepared for employment in their chosen fields. Many good jobs require a knowledge of science and mathematics. Employers and managers in the workplace of tomorrow want workers at

all levels who can solve problems, who can learn new skills on the job, and who have a basic understanding of science, math, and technology.

2. We can help the economy of our nation.
We will need well-prepared students who will be our future scientists, mathematicians, and engineers to keep our country creative and competitive. We will also need teachers of these subjects to prepare the next generation. And we will need people who work in other areas who are scientifically and mathematically literate.

The security of older workers will depend on the productivity of the next generation of workers. For example, a healthy economy means that more people are paying into social security that can then support people who retire at the end of their careers. Young or old, we all benefit when students completing their education are well-prepared to enter the workforce. In an age when more people are living longer, there will be greater needs for health care workers. With the development of fields such as biotechnology and genetics, there will be greater needs for technicians. With the rapidly developing computer and communications systems, there will be needs for mathematically literate workers. And we will always need people who can learn new skills for jobs that will be created in the future.

3. We can meet the challenges of development in our communities.
Many of our communities need more housing and new infrastructure to move people, goods, water, and waste and to allow for modern means of communication. We need carpenters, electricians, plumbers, and technicians. We need new housing designs that create better living situations. Young people can use science and math to prepare themselves to meet the challenges of development in their communities.

4. We can make difficult decisions sensibly and wisely. Many personal and community issues are rooted in science and mathematics. For example, how can an individual avoid diseases such as AIDS or tuberculosis and how can a community keep all its members healthy? How can someone on a tight budget reduce expenses by saving energy at home or how can a community save energy and reduce costs for all its taxpayers? Can understanding statistics and developing a number sense keep a person from being fooled by false advertising?

Lack of knowledge and understanding can make a person worried or afraid and dependent on someone else to make decisions. Information and knowledge empower a person. The more a person knows about the science and math that shapes his or her home and community life, the more empowered he or she will be.

5. We can understand and appreciate the world we inhabit. Children, young and old, take pleasure in knowing and understanding the natural world. People delight in finding patterns in nature that make things predictable and in seeing that nature can be fragile and mighty, simple and complex. Understanding how this amazing and interconnected world works — and our place in it — opens doors to appreciation on many levels.

Why do we need to change and reform the way children of all ages learn science and mathematics?

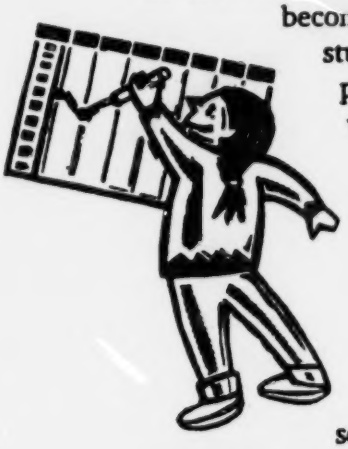
1. By the time they complete school, very few students are scientifically literate. Very few are prepared to study science and mathematics in college successfully. Most U.S. students lose interest in science as they approach the middle grades, even though most of them liked science in elementary school. Only about half of high school students take chemistry, and only one student in five takes physics. Some don't even know what classes to take. Girls, minorities, and other teenagers who do not plan to attend college are even less apt to take these science courses.

We are closing the gates on too many students too early in their lives, shutting them off from possibilities of a better future.

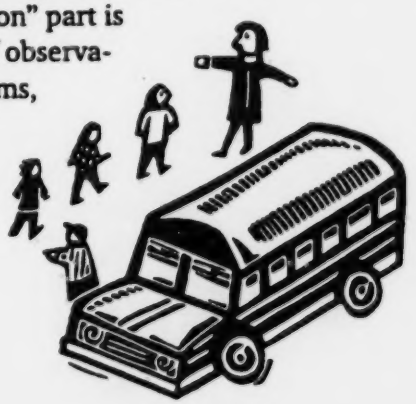
2. Science is not considered as important as reading and math in many schools. In many elementary schools, it is hardly taught at all. Most middle schools provide science for all students. In high school, it is not a required subject each year, and many students are discouraged from electing to take science courses.

While math is considered basic in schools, many girls and African American or Hispanic youth of either sex are not guided or encouraged to take algebra and advanced math courses. The adults in their lives may not believe they can succeed in science and math and steer them elsewhere.

3. Teachers are not prepared in their training as elementary school teachers to become confident, competent science teachers. In the higher grades, students may find a shortage of teachers prepared to teach physics or advanced science and mathematics courses. They will not find many teachers who can be role models for girls in the physical sciences or role models for either African American or Hispanic youth in science or mathematics. Very few teachers can teach science and math in a language other than English.



4. The approach to teaching science and math has many weaknesses in many if not most schools. The curriculum in science and math is too full of facts to memorize without "hands-on" experience or context for learning. Students are asked to cover so much material so fast that they run the risk of not learning anything at all. When they do have "hands-on" classes, the "minds-on" part is missing, that is, explanations and interpretations of observations and experiences. In many if not most classrooms, students learn science and math sitting at desks working by themselves. Without group learning, they are deprived of the chance to learn from their peers and of teaching someone else — itself a powerful tool for learning.



5. The expectations for student achievement and for performance in science and mathematics are too low. When science is taught only a few hours a week, students know that it is not valued. When girls from all groups and boys who are African American or Hispanic are discouraged from taking algebra or physical science or advanced science and math courses, our expectations are too low. Teachers, guidance counselors, parents, and public opinion are all responsible for encouraging all students to learn science and math, and this encouragement is not happening often enough.

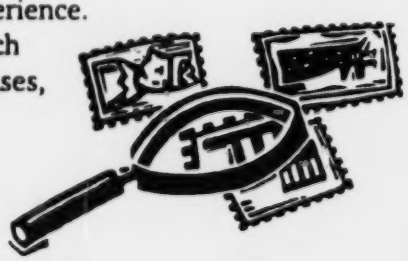
6. Too often teachers rely on multiple-choice tests that measure memorization of facts to assess their students. Teachers have little awareness of their students' understanding of concepts or their ability to ask good questions and use more than one way to find an answer.

What can we learn that can help us improve our children's chances for a better future and add to the national reform effort?

1. It is important to believe that all children can learn science and math. When parents, school people, and all the rest of society have high expectations for all children, they are building a foundation for a promising future.

2. There is more than one way to teach and to learn, and we must make use of what works best for each student.

3. Children can understand science and math more readily when these subjects are linked to a child's experience. Activities which make use of "hands-on" materials, such as counters, rods, leaves, twigs, water, magnifying lenses, calculators, and laboratory equipment, help students remember and understand.



Opportunities to talk about their own experiences that are related to science or math study help students make the connections that aid learning. Students who learn in groups benefit from being exposed to several points of view.

4. When students investigate a science problem in a way that a scientist might or solve a math problem as a mathematician might, they learn scientific and mathematical skills and habits of mind.

5. Students who are tested on their understanding of concepts or on their ability to solve problems with other students or on their skillful use of equipment will be more likely to achieve in those areas where scientific and mathematical knowledge and skills are applied.

6. All students should be exposed to challenging science and math problems. The practice of tracking holds many students back. Many educators believe that all students should be in science and math classes of students of mixed abilities. When students learn from and teach each other, everybody benefits. The more points of view a student is exposed to, the more he or she will understand that there is usually more than one good way to solve a problem.

7. Parent and adult involvement in the education of all children is critical for families, communities, and the country.

How can individual parents take part in the science and math reform effort?

They can

- value science and math education and communicate those values to their children,
- maintain high expectations and insist on high standards of achievement for all students,

- ensure that their child completes assigned work outside the classroom,
- know about and support new content, teaching methods, and assessment techniques in science and math education,
- learn how to understand what their child is learning by looking carefully at any reports and tests on their child and asking for further help interpreting assessment data when such help is needed,
- work to keep open two-way communication between home and school,

- recognize that one parent acting alone will not have as big an impact as a group of parents, and therefore,
- join with other parents in the school and community to support and work for beneficial changes in science and math education.

Who will use the SourceBook?

This SourceBook was written for community leaders who wish to increase the awareness of parents about

- the need for reforming science and math education,
- what they as parents can do at home to help their children succeed in science and mathematics,
- how they can support and work for better science and math education in their children's schools, and
- how they can use local community resources to benefit their children's science and math education.

What can a community leader find in the SourceBook?

The SourceBook contains valuable resources designed for flexible use. These are:

Resource Sheets

The Resource Sheets address ten important topics for parents in English and in Spanish. These will help parents to understand science and math reform. From the sheets, parents learn what they can do to help. Each Resource Sheet is in two forms, a one-page summary of the topic and a longer form that includes more explanation and detail.

The Resource Sheets can stand alone as a handout or a flyer, be used with parent programs already in place, or be used in parent awareness workshops specifically designed to reform science and math like the three contained in this guide. A parent leader can choose which of the sheets is appropriate to hand out to members of a specific audience. Use of the Resource Sheets is built into three workshops you will find in Section II of the SourceBook.

Step-by-Step Guides to Workshops

Three 1½ to 2 hour workshops for parents on improving their children's science and math education outline the activities, materials, and methods in detail.

Workshop One focuses on what parents can do at home.

Workshop Two focuses on how parents can interact with their children's school to reform science and math.

Workshop Three focuses on parent action in the community.

Included are script boxes as well as directions for "hands-on" experiences (to give participants a feeling of what their children's science and math learning should be like). The workshops can be conducted as a series so that an individual parent could come to all three, or because each workshop can stand alone, any of the three workshops can be conducted as a one-shot event or integrated into an existing parent program.

Bibliography
This section includes a short list of some of the important documents that support the contents of the Resource Sheets and SourceBook. These materials have been developed based on research in science and mathematics education.

Resources
This section lists some of the 100 examples of community participation in science and math reform that Project PRISM has included in a database housed at the National Urban League. This collection is designed to demonstrate that reform efforts come in many different forms. It also tells you where to get assistance if you would like to start a similar reform effort in your community. Some of the ideas involve large corporations in complex, expensive, long-term efforts, some are spearheaded by one person, some are national in scope, and some take place in a neighborhood with little cost.

What these efforts have in common is that they are initiated and sustained by people — people who care about the future of all of our children. These people are concerned with the quality of family and community life, jobs, and the prosperity of the country. They are people who realize that a strong science and math education for all students helps build the foundation for the future.

II. Parents' Roles in Science and Mathematics Education Reform: Creating Awareness and Action

In this section of the SourceBook, parents and community leaders will find guides to three community workshops for parents. The workshops may be offered as a series or each one can stand alone. There is a focus for each workshop: (1) what parents can do at home, (2) how parents can work to strengthen science and math at school, and (3) how parents can find and use community resources to help their children succeed in science and math. The goals for all workshops are to increase parents' awareness of the need for reform and to encourage parents to take action.

Each workshop is centered around a "hands-on" activity. Participants work together using materials to explore the answers to questions related to learning science and mathematics. It takes time and effort to get ready for a hands-on workshop. A leader might be tempted to cut down on preparation and clean-up time by omitting the "hands-on" activity. *Do not omit the "hands-on" part of any workshop.* It is important that you model for parents the kind of "hands-on," problem-solving experience we hope they will seek for their children. Try to set the stage for parents to have fun finding out. There are no single right answers. Instead, there are good explanations and discoveries.

There are sections of workshops that you may decide to leave out in order to have plenty of time for the "hands-on" activity and for participants' discussions. Some sections are labeled optional and are resources for leaders who may wish to use them.

Overhead projectors may not be available for workshops. You may leave out sections of workshops that require an overhead transparency. Or you can write out the text onto large newsprint for participants to read as you go over the transparency text verbally.

The suggested times are approximations. Leaders may use times to plan and to monitor a workshop once it is under way.

Of course, you need to gather parents for these workshops. This is not always easy — parents lead busy lives and have many responsibilities. The very first part of this section provides guidance for leaders who wish to learn more about how to gather parents for workshops.

A. How to Gather Parents for Workshops

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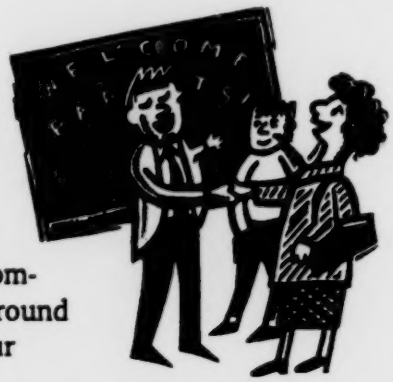
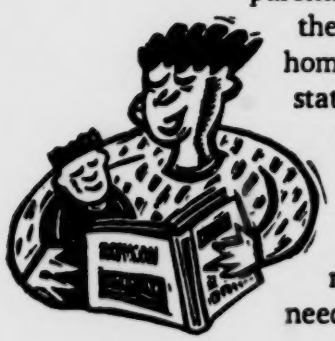


Strategies for gathering parents will vary from community to community. To be effective in getting parents to know about and participate in your program, it is necessary to be familiar with your particular audience — the parents you are trying to assemble. It is also important to be aware of the obstacles that would prevent parents in the community from attending and to work hard to move around these obstacles. In gathering parents, the key to your success depends on this awareness.

Ask yourself if you are aware of the language spoken and understood by these parents. If you plan to gather parents by sending a letter home with a child or posting a flyer, consider not only what language to use but also whether your message is clearly and simply presented. Do parents work outside the home? Which shifts? Do parents have child care? Do they have access to transportation? Do these parents see a need to attend these meetings and become involved in a parent program? Knowing the answers to these questions will determine the type of outreach strategies that will be effective for your particular audience.

Once you are familiar with your audience, you can determine which outreach strategies will be most effective. Overall the most effective way of gathering parents is by using more than one strategy to motivate them to attend the meeting. For example, an impersonal effort such as a letter sent home with a child or an announcement on the local radio or television station may not be enough to influence some parents to attend. But if you add a phone call or a face-to-face invitation, it may encourage the parent to attend. In addition, you will find that phone calls and face-to-face conversations not only personalize the invitation but also may help you understand the parents" needs and concerns. For example, you will discover which parents need child care and transportation in order to attend the meeting.



For any strategy to be effective, it is necessary to be sensitive to the needs and preferences of the parents you are targeting. Below are five suggestions that are essential to keep in mind while trying to assemble a parent meeting. These

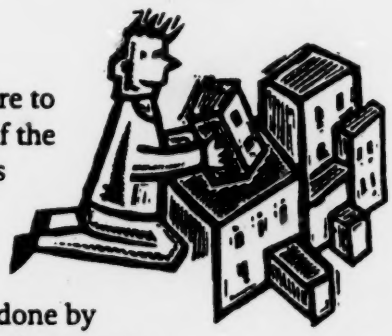
suggestions should serve as a guide to ensure your sensitivity to the needs of the parents. Listed under these suggestions are strategies that will motivate parents to attend the meeting or become a part of the parent program. Again using more than one strategy will prove most effective; and make sure that these strategies are customized to fit the needs and to address the concerns of the parents you are working with.

1. Learn about your community.

Always keep your audience in mind. You may be able to gather information regarding your audience by contacting other agencies that might work with these parents or by contacting the schools. Organizations, agencies, and schools that are in touch with the parents you hope to reach might want to join you in sponsoring the workshop.

2. Build relationships among the parents and between the parents and the coordinators.

Parents will be motivated to attend meetings and become a part of the program if they have developed a relationship with you and with other participants. Gaining a sense of community will encourage parents to attend. The more people you develop a relationship with and the wider the variety, the easier it will be for you to gather families for meetings and workshops.



- Make phone calls to parents. A personal phone call stresses the importance of the meeting and your desire to see the parent there. You can address the concerns of the parent and gain a greater understanding of the needs of the parents you are working with. After a few meetings and when parents have become comfortable with one another, create a "telephone tree" to notify parents of subsequent meetings. This may be done by distributing a phone list to each parent and asking each parent to be responsible for notifying the next person down the list about the meeting.
- Make home visits or make yourself available at a time when you know parents will be assembled at the community center, the school, etc. Create an opportunity to meet with parents face-to-face and to discuss the importance of parent involvement in science and math education. Listen to the needs and concerns of individual parents and guide them to an understanding of the importance of the parent program you are coordinating.

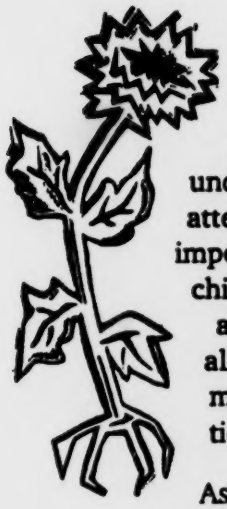
3. Provide comprehensible information.

Make sure announcements or notifications of a meeting are made or sent home in a language parents will understand. In many communities, sending a letter home in English with a child is not adequate outreach. Know the languages spoken and read by the parents you are trying to target and send letters home or make announcements in these languages. Do not assume that a parent who speaks a certain language can also read in that language. A phone call to these parents may be the best way to reach them.

Also keep in mind the range of educational backgrounds of parents.

- Send a letter home with the child that discusses meeting times, the availability of transportation and child care, and the importance of attending this meeting.
- Make announcements using the local radio or television station to inform the parents in your community about the need for such a program and the details surrounding the meeting (time, place, and availability of child care and transportation).

- Make announcements after church services or during other community meetings. Answer questions that may arise and be sure to provide all the necessary details concerning the meeting.
- Create flyers and post them in areas that will be visible to the parents you are trying to assemble (for example, near the school, church, or community center, bus stops, grocery stores, gas stations, etc.). You may want to use a bright color to get attention. Make sure the flyer provides all the necessary information. The flyer should include a phone number so that parents can obtain more information about the meeting.



4. Build parents' motivation to participate.

Make sure that enough information is provided to parents so they understand why their involvement is necessary. Why should parents attend this meeting? If parents understand that science and math are important in their child's life and that they can make a difference in their child's academic achievement in these subjects, the likelihood of their attendance is greater. Provide parents with information that will allow them to understand that their attendance is important and can make a difference. Letters home, phone calls, face-to-face conversations, and announcements should all cover this vital information.

Ask teachers to discuss the meeting and/or parent program and its importance with parents whom they come in contact with. Teachers can increase parents' motivation to attend by reinforcing the importance of parent involvement.

5. Make meetings accessible.

Make sure that the parent meeting is made accessible to parents. Provide child care and transportation if possible. Parents cannot attend if they have no way of getting to the meeting place or if they feel they must make their own arrangements for child care. If the meeting is held around a mealtime, try to provide food as well. In some communities, the hours from six to eight in the evening are best for most parents. Saturdays are good times for parents in other communities. Make attendance as easy and convenient as possible for all parents.

6. Find ways to show parents that you appreciate and respect their participation.

Successful parent leaders say that small niceties make a big difference. For example, a simple thank you goes a long way, a note when a child is sick, a flower given at a meeting. One parent leader gives each participant a flower as he or she signs in to a meeting. Another asks local merchants for door prizes that are raffled off at parent meetings.

Parents have opinions but are not always asked for them. Successful parent leaders create opportunities for parents to share their opinions so that they feel they have been listened to.

7. Be patient. Things don't happen overnight.

Your first parent meeting may be small. But your parent outreach program will grow if as a leader you

- know your subject matter,
- make participants feel important and their service valued,
- develop your own style and level of comfort in presenting your material,
- keep reaching out, and
- encourage those who first become involved to bring a friend to the next meeting.

B. Community Workshop: Session One

At Home

B. Community Workshop: Session One

At Home

Audience:

Parents and other members of the community such as school and business people. An audience of up to 25 people is a good size for an interactive workshop. The more people who attend the workshop, the more coleaders you will need.

Overview:

The goals of this at-home session are to

1. Help participants get acquainted with each other and the program staff and begin to develop a sense of team and community,
2. Increase awareness about why it's important to excel in science and math,
3. Give participants an experience of what they can do at home to help children excel in science and mathematics,
4. Help parents plan action steps for home activities that promote science and math learning.

Suggested Time:

5 minutes — Welcoming
10 minutes — Getting Acquainted and Forming Table Groups
10 minutes — Creating Awareness
30 minutes — Indicator Armadillo Activity
10 minutes — Hands-On/Minds-On (optional)
30 minutes — Taking Action: What Parents Can Do at Home (includes video)

About two hours total time

Before the Session:

1. Review "How to Gather Parents for Workshops" in this SourceBook. Use the suggestions found in that section to let parents know about this meeting.

2. Review materials list and purchase/assemble necessary items.

3. Make copies of the handouts for the number of parents and community members you think will attend this session.

4. Set up a registration table with a sign-in sheet and name tags. Set up a refreshment table in another part of the room.

5. Set up and test out the overhead projector so that it is in focus and projects on a screen or blank wall.

6. Set up the VCR and TV. Test the video. Set the video so you can press "play" to begin the tape.

7. Arrange the room so that participants can sit at tables in groups of four.

8. Set up the materials table for the *Indicator Armadillo Activity* (H-1-1).

9. Make arrangements for child care.

Personnel:

It is recommended that the parent leader guide this session with the assistance of coleaders, although this session can be conducted alone if necessary.

Materials List:

- Name tags
- Sign-in sheet
- Resource Sheets: *Math Opens Doors... and It's Fun Too, Characteristics of Good Science Programs, Science and Math at Home for Young Children, Science and Math at Home for Children Ages Six to Ten, Science and Math at Home for Middle Schoolers, Science and Math at Home for Teenagers, Building a Strong Parent/School Relationship* — Have enough copies to give one of each to every participant.

- Refreshments
- Overhead projector (if available)
- VCR, TV monitor, and videotape
- Newsprint, markers, and masking tape

For the Indicator Armadillo Activity

- One small can frozen grape juice concentrate thawed (each can is enough for 12 participants)
- White drawing, construction paper, or paper towels (paper should be absorbent)
- Pencils or crayons
- Scissors (one per group)
- One box baking soda
- Small bottle of white vinegar
- Small paper cups (three per group)
- Plastic coated paper bowls (three per group)
- Plastic teaspoons (three per group)
- Measuring cup
- Cotton swabs
- Paper towels
- Container of water (about two cups)
- Styrofoam meat trays (one per group)
- *Indicator Armadillo Activity* (H-1-1)(one per group of 4)
- *Indicator Armadillo Data Sheet* (H-1-1)(one per group of 4)

Guiding the Session:

1. Welcoming (5 minutes)

As parents enter, greet them and direct children to the child care room you have provided. Have parents sign the sign-in sheet and fill out a name tag. Invite them to enjoy the refreshments while the group is gathering.

2. Getting Acquainted (10 minutes)

A. The parent leader welcomes the group introducing himself/herself and any other project staff.

B. The parent leader uses the following "Pair and Share" get-acquainted activity:

"

- *Find a partner (preferably someone you do not know) and introduce yourself. Tell your partner the name(s) and age(s) of your child (children).*
- *Next, talk about your very first memory of learning science or math (or both). What was the experience like? What was the topic/activity? What did you do during the learning? You will have approximately four minutes (two minutes each) for this introduction.*
- *Each pair should now hook up with another pair. The four of you can sit together at one of the tables.*

"

C. After they are settled at tables, say:

"

- *Each person will briefly introduce his/her partner by telling your partner's name and one thing you remember about your partner's experience learning science or mathematics. (You will have about one minute for each introduction.)*

"

3. Creating Awareness (10 minutes)

A. Introduce this workshop session to the group by making the following important points:

"

- *This session's main goal is to help parents help their children to excel in science and math.*
- *The workshop aims to create awareness of issues around science and math learning for children and their families.*
- *We also want to help parents take action on behalf of their children and encourage parents to get others involved — other parents, community members, and organizations.*

- *Your own experience with learning science and math in school or outside of school has had an influence on how you feel about science and math education right now. No matter how it was for you, today it is very important that every child learns science and math.*

"

B. Have participants discuss the following questions at their table groups. Ask a few groups to report after each question.

"

- *Can you think of some reasons why learning science and math is important?*
- *What are ways you use science and math knowledge and skills in the following activities?*
  - *— Baking bread*
  - *— Building shelves*
  - *— Choosing vitamins*
  - *— Deciding to quit smoking*
- *Can you come up with three jobs in your neighborhood that require science and/or math skills?*

"

C. Use Transparency T-1-1 *Learning Science and Mathematics — What's the Big Deal?* or a newsprint copy. Highlight the important points. ***(OPTIONAL)***

4. Indicator Armadillo Activity (30 minutes)

Knowing what good science and math education is like when you see it.

A. Tell the group the following important points:

"

- *It is very hard to try to explain what good science and mathematics learning is all about through words.*
- *Imagine what it would be like to explain to someone the pleasure of eating good chocolate — you can't. Each person must experience the taste for himself/herself.*
- *We know a lot about what helps children be successful science and math learners. We are going to do an activity together that will give us a feel for what good science and math learning should be like.*

"

B. Explain the following to the group:

"

- *This is an activity adapted with permission from* "WonderScience: Fun Physical Science Activities for Children and Adults to Do Together."
- *You are about to discover something about how several different things interact with each other.*
- *To find out about these substances, you will use a chemical indicator (grape juice soaked into a paper armadillo).*
- *An indicator shows or points out something: A smile indicates happiness; a thermometer measures the temperature; dark clouds indicate that it may rain.*

"

C. Ask and explain the following:

"

- *Does anyone know what an armadillo is? (It is a small burrowing animal whose body is covered with a protective armor.)*
- *We could use plain paper to soak up the indicator, but the armadillo is more fun.*
- *You will use the armadillo to test for chemical changes. A change in color indicates a chemical change.*

"

D. Everyone in the group will have a different role. Use Transparency T-1-2 *Armadillo Activity Roles* to assign roles to each group of four as follows or write the four roles on newsprint. Begin with the first role saying this:

"

- *The Materials Manager will be the person in your group with the wildest shoes. (Have each group come to an agreement about who that person is.)*
- *The Recorder will be the person to the right of the Materials Manager.*
- *The Cutter/Questioner will be the person to the right of the Recorder.*
- *The Mixer/Pourer will be to the right of the Cutter/Questioner.*

"

E. Pass out one copy of the *Indicator Armadillo Activity* (H-1-1) to each group. Say the following:

"

- *The directions are easy to follow and are explained by each role. You may begin your experiment by following the directions on the handout.*

"

F. Circulate among groups and answer any questions that come up.

G. After the activity, have the groups discuss the following questions one at a time. Ask a few groups to report about each question.

"

- *What were some differences between how you learned science and math and the Indicator Armadillo Activity?*
- *Although this was mostly a science activity, it did involve some math skills. What were they? (measuring, remembering sequence, recording data)*
- *Could you do this activity at home with your own children?*
- *What do you think you might use as an indicator instead of grape juice? (beet juice, flower petal juice, red cabbage juice)*
- *How could you extend this activity? (Try other indicators, try other liquids such as fruit juices, shampoo, soapy water, etc.)*

"

At this point, encourage everyone to help clean up.

Note: Some participants may want to know why the color changes "work." There are substances scientists call "acids" and substances that are called "bases." There are also substances that are neutral — not acids or bases. Pure water is an example of a neutral substance. Vinegar, rain, lake water in some places, and fruit juices such as orange and lemon juice are weak acids. Baking soda in water, some shampoos, and detergents are weak bases. There are also strong acids and strong bases that must be handled carefully using safety precautions and not by children. Acids and bases can neutralize each other. We can use indicators to tell us whether a substance is acidic, basic, or neutral. Understanding acids and bases is important to many scientists and other people in their work. Because many indicators occur naturally and the color changes are interesting and often beautiful, indicator-acid-base activities such as *Indicator Armadillo* are a good way to introduce chemistry to children and their adult partners.

H. Show Transparency T-1-3 *Good Science Education Means...*, or refer to your newsprint display. Explain/ask the following:

"

- *Many national professional groups agree what good science education should look like.*
- *Which of these things (on the transparency or newsprint) did we practice in the Indicator Armadillo Activity?*
- *There is also agreement that parents play a very important role in their children's science and math education. A first step for parents is to know what kind of science and math experiences their children should have. The Indicator Armadillo Activity gave us an idea that learning can be interesting and fun and make us want to learn more.*
- *Much of the information in the transparency is outlined in some Resource Sheets that you may pick up and take home at the end of the session. (Hold up Resource Sheets* Math Opens Doors ... And It's Fun Too! *and* Characteristics of Good Science Programs.)

"

5. Hands-On/Minds-On (10 minutes) ***OPTIONAL***

Show Transparency T-1-4 *Three Kinds of Learning* or a newsprint copy and review its major points. Explain the following:

"

- *Good science and mathematics education moves away from passive, unchallenging learning toward active, mentally challenging learning.*
- *Which one of the three ways of learning reflects how you learned science and mathematics most of the time? Rote? Hands-on? Minds-on? (Ask for a show of hands.)*

"

6. Taking Action: What Parents Can Do at Home (30 minutes)

A. Tell the group the following important points:

"

- *When parents are aware that science and math are important for their children and that parent support of their children's science and math learning is very important, they want to know what actions they can take.*

- *Here are four Resource Sheets that are designed to help support your efforts at home to help your child or children be successful in learning science and mathematics.*

  The Resource Sheets are divided by ages of children:
  Science and Math at Home for Young Children (ages 3-6)
  Science and Math at Home for Ages Six to Ten
  Science and Math at Home for Middle Schoolers (ages 10-13)
  Science and Math at Home for Teenagers

  Here is an example of what one of them looks like. (Hold up one or two Resource Sheets.)

- *By actively using the suggestions from the "at Home" Resource Sheets and adding your own ideas and activities, you can help your children to excel in science and math.*

- *Another Resource Sheet examines how to create good home study environments — for children of school age:* Homework Is Part of Science and Math Success.

"

B. You may choose between two videos at this point in the workshop. Both the English language video and the Spanish language video give visual examples of what it looks like when parents use home activities to help their children learn science and math. Preview the video that you plan to show if you can. Or you may read a short description of each of the videos, found on pages 13 and 14 of this workshop. Your choice of which one to use will depend upon your audience.

Read the following preview question:

> *As you watch the following video, can you think of opportunities to incorporate science and math into your own home life?*

Play the videotape.

C. After the video, place several copies of the same-age Science and Math at Home Resource Sheet at different tables. Place several copies of Resource Sheet *Homework Is Part of Science and Math Success* at each table.

Instruct participants to go to the table that represents the age range of their child or children. If they have children of several ages, ask them to choose one age group.

Have each group do and discuss the following:

> - *In your group, take the next five minutes to review the strategies in the age-appropriate Science and Math at Home Resource Sheets.*
> - *Which of the activities on the Resource Sheet have you already done? What happened?*
> - *Which activity(ies) would you like to try right away?*
> - *On newsprint, make a list of activities you have done and indicate if you would or would not recommend them to other parents.*

D. Pass out newsprint and markers to each group and have the group members record activities they have tried and how successful each activity was.

E. Instruct the groups to tape their newsprint sheets to the wall and, if there is time, have a spokesperson from each group report about successful science and math activities.

F. Pass out one copy of Handout H-1-2 *Personal Action Plan for Parents* to each person.

> *There are many actions parents can take at home to help their child or children learn science and math. A good way to get started is to begin with one or two. On this sheet, there are spaces to list two actions you think you will take. Fill out your plan now or take it home with you and complete the plan after you have had some time to think about what you will do.*

If there is time, ask a few participants to share one item from their plan with the whole group.

G. Ask if anyone has questions or needs clarification on anything from this session.

H. Invite participants to take home copies of any of the seven Resource Sheets they think they will find useful.

I. Thank participants for coming and mention the date, time, and topic for any additional meetings you have planned.

Summary of English-Language Video:

This video presents a day in the life of the Romans, a Hispanic family who lives in Brooklyn, NY. The parents, Yvonne and Bobby, believe that education is the number one priority in their children's lives and that parental involvement is key.

Recognizing the particular importance of science and math education, Yvonne and Bobby see learning science and math at home as an extension of what is learned at school. Simple household activities — ranging from shopping to cooking to playing sports — provide family members of all ages with inexpensive and fun ways to incorporate science and math into their daily experiences.

Summary of Spanish-Language Video:

The Spanish-Language Video is a single tape that may be viewed in its entirety in this workshop. Or you may show only the third segment, which focuses on what families can do at home as part of daily family life to stimulate and support their children's interest in science and math.

Workshop leaders should preview the video. Your choice of whether to show the whole video or only the third segment will depend upon how much workshop time you wish to commit for the video activity.

Third Segment:

This portion of the video presents an evening in the life of the Alvarados, a Hispanic family living in the San Fernando Valley in Los Angeles County. The parents believe that their children's science and math education is a fundamental part of their future career advancement in life. They believe that parents are responsible for motivating their children and encouraging them to succeed in school. Both Mr. and Mrs. Alvarado work outside the home during the day and attend night school. With their busy schedules, they still make time to play an important role in their children's education. Mrs. Alvarado uses the preparation of the evening meal to teach her children about everyday math. Both parents help review homework and applaud their children's accomplishments. The Alvarados show how even games played with their youngest children can build an awareness and interest in science and math.

Learning Science and Mathematics—What's the Big Deal?

- Learning science and math today opens the door to good jobs tomorrow.
- Understanding science and math encourages people to become more responsible for their environment.
- Without people who excel in science and math, the U.S. will be less able to compete in the world economy.
- People with good backgrounds in science and math can make better health choices and can recognize false or misleading claims.
- U.S. students are less prepared today in science and math than they were in the past.
- One of the top education goals of our nation is to "make American students first in the world in science and math achievement."

T-1-2

Armadillo Activity Roles

Materials Manager
brings materials from a central location to group members; returns materials when finished

Cutter/Questioner
traces with pencil and cuts out the armadillo; asks thinking questions to the group

Mixer/Pourer
mixes, pours, and lines up bowls throughout the activity

Recorder
labels items and records the group's findings and predictions on the *Indicator Armadillo Data Sheet*

Dipper
everyone takes turns dipping the armadillo.

40

T-1-3

Good Science Education Means...

- Students are active; they do things — build, taste, observe, test, smell, etc.
- Students ask lots of questions.
- Students work in groups much of the time.
- Students learn science every day.
- Activities encourage students to think by making predictions, comparisons, and conclusions.
- Students demonstrate what they do know through tests and other alternatives such as activities, answering thinking questions, and writing about things they have learned.
- Writing, art, geography, and math can all be a part of science programs.
- Students make connections between science and their own lives.

T-1-4

Three Kinds Of Learning

Rote

Learning: Memorization or repetition carried out with little depth or understanding.

Example: Memorizing what the vinegar and baking soda would do to the Indicator Armadillo without trying it out.

Hands-On

Learning: Active learning in which students use materials to make things.

Examples: Making and dipping the Indicator Armadillo

Minds-On

Learning: Critical thinking skills developed through the processes of designing, comparing, and drawing conclusions.

Example: Using their experience to predict a color change in the Indicator Armadillo.

Indicators: Indicators that students are thinking deeply about their learning include when they ask "What if," "How come," and "Can we try it another way" questions after a learning activity.

H-1-1

Indicator Armadillo Activity

1. Each person in your group will have a role.

Materials Manager: brings materials from a central location to group members and returns them when finished

- Paper cup with 1/4 cup grape juice concentrate (use the measuring cup at the materials table)
- One sheet white drawing or construction paper or paper towel
- Pencil or crayon
- Scissors
- Baking soda — small amount in a paper cup
- Vinegar — small amount in a paper cup
- Three plastic coated paper bowls
- Three plastic teaspoons
- Cotton swabs
- Paper towels
- Container of water

Cutter/Questioner: traces the armadillos at the end of this handout onto drawing paper using a pencil or crayon; labels each with a number 1 through 4 on their tails; cuts out the armadillos with the scissors; asks thinking questions of the group

Mixer/Pourer: fills one cereal bowl half full of water; adds 2 teaspoons of baking soda to the water and stirs; fills a second bowl half full of vinegar; adds 1/4 cup grape juice concentrate to 1/4 cup water in the third bowl and stirs; keeps bowls lined up and in order

Recorder: labels the first bowl "baking soda," the second bowl "vinegar," and the third bowl "grape juice"; records the group's findings on the Data Sheet

Dipper: everyone in the group shares this role

2. Here's what someone might see and hear as your group begins its exploration.

- ***Questioner:*** says "What do you think will happen when Armadillo 1 is dipped into the grape juice solution? Let's make a prediction."
- ***Recorder:*** records the group's predictions on the Data Sheet found at the end of this handout.
- ***First Dipper:*** holds Armadillo 1 by the tail and dips it into the grape juice bowl; lets the extra juice drip into the bowl.
- ***Recorder:*** records the color of the Armadillo on the Data Sheet at the end of this handout.

3. Continue your exploration using the *Indicator Armadillo Data Sheet* as a guide to your activities. But remember, you may have your own ideas for investigations that are just as good — even better — than the ones suggested here. Go to it! Have fun!

The *Indicator Armadillo Activity* has been adapted with permission from *WonderScience: Fun Physical Activities for Children and Adults to Do Together*. ©1994. A publication of the American Chemical Society and The American Institute of Physics.

H-1-1 continued

Indicator Armadillo Data Sheet

Armadillo 1 (Dip the armadillo in the liquids in order!)

Liquid	Color Prediction	Color It Turned
1. Grape Juice		
2. Baking Soda		
3. Vinegar		

Armadillo 2 (Now dip in this order!)

Liquid	Color Prediction	Color It Turned
1. Grape Juice		
2. Vinegar		
3. Baking Soda		

Armadillo 3

Challenge question: Can your group make an armadillo with blue stripes and pink dots with blue centers?

What did you try? What worked? Can you explain *why* it worked?

Armadillo 4

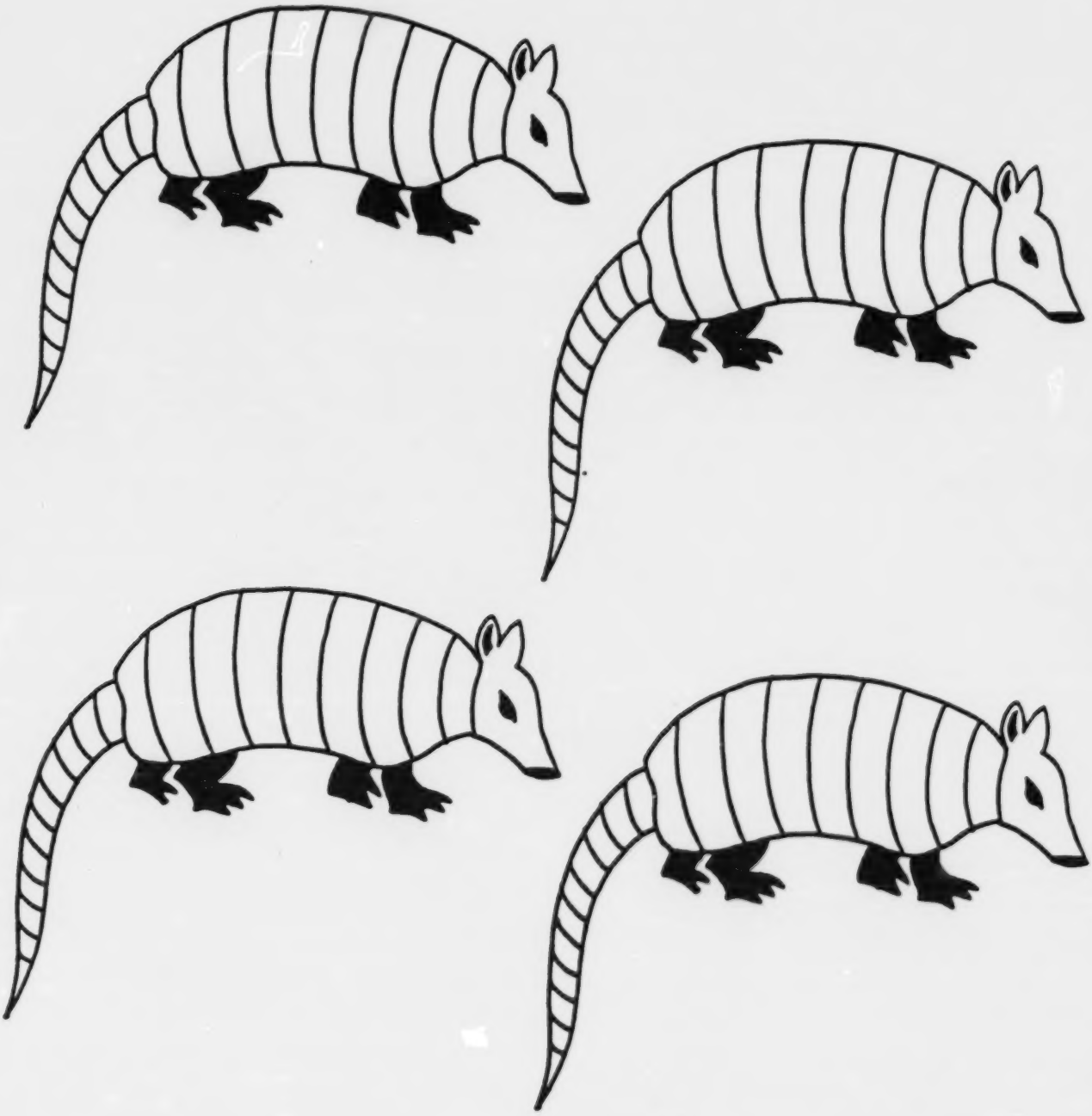
"Invisible inks" are the same color as the paper. Messages written with invisible ink need to be dipped in or sprayed with another liquid to be read.

Challenge question: Can your group use these materials to write "invisible ink" messages?

What did you try? What worked? Can you explain *why* it worked?

H-1-1 continued

The Indicator Armadillo



H-1-2

Personal Action Plan for Parents

Two things I can do at home to help my child(ren) be successful in science and math:

1. _____

_____

_____

_____

_____

_____

_____

2. _____

_____

_____

_____

_____

_____

_____

C. Community Workshop: Session Two

At School

C. Community Workshop: Session Two

At School

Audience:

Parents and other members of the community such as school and business people. An audience of up to 25 people is a good size for an interactive workshop. The more people who attend the workshop, the more coleaders you will need.

Overview:

The goals of this at-school session are to

1. Help participants get acquainted with each other and the program staff and begin to develop a sense of team and community,
2. Increase awareness about why it's important to excel in science and math,
3. Give participants an experience of what good science and math education looks and feels like in the classroom,
4. Explore action steps that promote science and math learning at school, and
5. Outline how parents can get others involved.

Suggested Time:

5 minutes — Welcoming
10 minutes — Getting Acquainted and Forming Table Groups
10 minutes — Creating Awareness
25 minutes — Parents Can Help (includes video)
35 minutes — Construction Challenge Activity
10 minutes — Taking Action: What's Happening at School
10 minutes — Personal Action Plan and Wrap-Up

About 2 hours total time

Before the Session:

1. Review "How to Gather Parents for Workshops" in this SourceBook. Use the suggestions found in that section to let parents know about this meeting.
2. Review materials list and purchase/assemble necessary items.
3. Make copies of the handouts for the number of parents and community members you think will attend this session.
4. Set up a registration table with a sign-in sheet and name tags. Set up a refreshment table in another part of the room.
5. Set up and test out the overhead projector so that it is in focus and projects on a screen or blank wall.
6. Set up the VCR and TV. Test the video. Set the video so you can press "play" to begin the tape.
7. Arrange the room so that participants can sit at tables in groups of four.
8. Set up the materials table for the *Construction Challenge Activity* (H-2-1).
9. Make arrangements for child care.

Personnel:

It is recommended that the parent leader guide this session with the assistance of coleaders, although this session can be conducted alone if necessary. The following materials are needed in this session.

Materials List:

- Name tags
- Sign-in sheet
- Resource Sheets: *Math Opens Doors... and It's Fun Too, Characteristics of Good Science Programs, Building a Strong Parent/School Relationship* — Have enough copies to give one of each to every participant.
- Refreshments
- Overhead projector (if available)
- VCR, TV monitor, and videotape
- Newsprint, markers, and masking tape

For the Construction Challenge Activity

(for each group of four participants)

- Three sheets of white paper cut in half lengthwise
- One egg carton cut or broken in half
- Scissors
- Ruler
- Pennies (100 for every four participants)
- Colored stickers or Post-it™ note pads
- *Construction Challenge Activity* (H-2-1) (one per group of 4)
- *Construction Challenge Data Sheet* (H-2-2) (one per group of 4)

Guiding the Session:

1. Welcoming (5 minutes)

As parents enter, greet them and direct children to the child care room you have provided. Have parents sign the sign-in sheet and fill out a name tag. Invite them to enjoy the refreshments while the group is gathering.

2. Getting Acquainted (10 minutes)

A. The parent leader welcomes the group introducing himself/herself and any other project staff.

B. The parent leader uses the following "Four Corners" get-acquainted activity:

1. Use a bold marker to write the following subjects on four pieces of paper: English, History, Math, Science.

2. Tape each subject around the four corners of the room.

3. Give the following instructions to the group:

> *"Each person should go to the corner of the room that represents the subject you liked best in school. Now pick one partner, introduce yourselves, and share why this was your favorite subject."*

4. Ask each pair of partners to join up with another set of partners from a different corner of the room. The four of you should then sit together at one of the tables.

"*Each person should take a minute to introduce your partner to the pair you've just joined up with. Tell your partner's name and explain why the subject you chose was also your partner's favorite.*"

3. Creating Awareness (10 minutes)

A. Introduce the workshop session by making the following important points:

"
- *Our main goal for this workshop is to help parents help their children to excel in science and math.*
- *This workshop aims to create awareness of issues around science and math learning for children and their families. Also we hope to encourage parents to take action on behalf of their children and to get others involved — other parents, community members, and organizations.*

"

B. Have participants discuss the following questions at their table groups. Have a few groups report after each question.

"
- *Can you think of some reasons why learning science and math is important?*
- *Can you think of ways you use science and math knowledge and skills in the following activities?*
  - *— Baking bread*
  - *— Building shelves*
  - *— Choosing vitamins*
  - *— Deciding to quit smoking*

- *Can you come up with three jobs in your neighborhood that require science and/or math skills?*
- *How many of you enjoyed these subjects more in the younger elementary grades than when you got older?*
- *Many people across the nation liked learning these subjects more when they were younger. Discuss in your table groups why this might be true. (Typical reasons will include it was fun, easier, more active, less boring.)*

"

4. Becoming Aware: Parents Can Help (25 minutes)

A. Tell the group that although parents are a child's first teachers, it is the school's job to help students excel in science and mathematics. Schools and parents can work together to aim for quality science and mathematics education programs.

B. Explain the following:

"

As parents, you can help schools do a better job by
- *knowing good science and math education when you see it,*
- *finding out if your child's school has a good program in place, and*
- *learning how to urge schools to develop good programs if they are not in place.*

In the rest of this meeting, you will learn more about how to do all three of these things.

"

C. You may choose between two videos at this point in the workshop. Both the English language video and the Spanish language video give visual examples of new ways to teach and learn science and math that can help students be successful in these subjects. Preview the video that you plan to show if you can. Or you may read a short description of each of the videos, found on pages 11 and 12 of this workshop. Your choice of which one to use will depend upon your audience.

Read the following preview questions to parents and ask them to think about these questions as they view the videotape.

> *How is the "new" science and math different from the "old" science and math?*
>
> *Are there ways you can become more involved in your child's school?*

Play the videotape.

Ask participants to spend four or five minutes commenting on what they have just seen.

5. Construction Challenge Activity (35 minutes)

Knowing what good science and math education is like when you see it.

A. Explain to/ask the group:

> - *There is nothing like firsthand experience to make us aware of what good science and math education looks like when we see it.*
> - *The Construction Challenge Activity part of this workshop was adapted with permission from a publication called* WonderScience: Fun Physical Science Activities for Children and Adults to Do Together.
> - *You are about to discover something about how to design and build a structure.*
> - *Discuss the following question within your group: "If you wanted to build a structure such as a house, bridge, or stadium, what questions would you need to answer before you began your project?"*

B. After a few minutes, ask the groups to report and record their comments on newsprint.

C. Make sure the groups have mentioned two important things:

- Building materials and
- Designing a structure that will work with those materials.

D. Give the group the following instructions:

> *"*
>
> - *Your challenge is to build the strongest bridge you can, using only 1/2 sheet of paper!*
> - *Each group will test the strength of its bridge by gently stacking pennies one at a time onto the paper bridge.*
>
> *"*

E. Use Transparency T-2-1 *Construction Challenge Activity Roles* to assign roles to each group of four or write the four roles on newsprint. Explain that:

> *"*
>
> - *Everyone in the group will have a different role.*
> - *The Materials Manager will be the person in the group with the longest fingers. Each group should agree about who that person is.*
> - *The Recorder/Reader will be the person to the right of the Materials Manager.*
> - *The Cutter/Questioner will be the person to the right of the Recorder/Reader.*
> - *The Paper Folder will be the person to the right of the Cutter/Questioner.*
>
> *"*

F. Pass out one copy of the *Construction Challenge Activity* (H-2-1) and one copy of the *Construction Challenge Data Sheet* (H-2-2) to each group. The directions are easy to follow and are explained by each role.

Tell the groups that they may begin their activity by following the directions on the handout. Workshop leaders should be available to help the groups get started.

G. In the meantime, draw a big Whole-Class Data Sheet on newsprint. Use the sample on page 13 as a guide. Leave enough room for each group to report its results.

H. Circulate among groups and answer any questions that come up.

I. After the activity, have the Recorder/Reader take the *Construction Challenge Data Sheet* and some stickers or Post-its™ to the Whole-Class Data Sheet. Write your team's name on each Post-it™ or sticker. Place the stickers or Post-its™ near the number of pennies each team got for each bridge.

J. After the activity, lead a whole-group discussion by making the points below and asking the groups the following questions. (Allow the teams to discuss each question within their groups first before reporting to the whole class.)

"

- *Take a look at the Whole-Class Data Sheet and note which bridge seems to be the weakest and which is the strongest.*
- *Note how many pennies the strongest bridge held.*
- *What do you think it is about the accordion bridge that gives it strength?*
- *What is it about the walled bridge that gives it strength?*
- *What surprised you most about this Construction Challenge Activity?*
- *If your group had one bit of advice to give to a bridge builder, what would it be?*
- *What are some differences between how you learned math and what you just experienced in this activity?*
- *Could this be either a science or a math activity?*

"

K. Show Transparency T-2-2 *Good Mathematics Education Means...* or refer to newsprint copy reviewing each point. Explain/ask:

"

- *Many national professional groups agree what good mathematics education should look like. This transparency is a summary of their findings.*
- *Do you think this type of mathematics education is going on in your child's school and if so, what are some examples?*
- *This is the kind of mathematics learning that should be happening in your child's school.*

"

At this point, encourage everyone to help clean up.

6. Taking Action: Find out if your child's school has a good science and mathematics program in place. (10 minutes)

A. Tell participants the following:

"

- *Now that you know what effective science and math learning looks and feels like, you should find out if your child's school meets high standards.*

"

B. Give each group one of the two Resource Sheets: *Math Opens Doors ...And It's Fun Too!* and *Characteristics of Good Science Programs.* Use the single-page version for this part of the workshop.

Explain the following:

"

- *Your group has been given either* Math Opens Doors...And It's Fun Too! *or* Characteristics of Good Science Programs. *Later you will be given both Resource Sheets to take home, either the single-page version or the longer four-page version.*

- *In your groups, read the sheet you have been given. Think about the experience you have just had testing the strength of bridges. In the next five minutes, discuss with your group how the Resource Sheet, video, and the workshop activity can increase parents' awareness and understanding of what science and math programs can be like for their children.*

"

C. Pass out Handout H-2-3 *Evaluating Your School's Science and Mathematics Programs.*

D. Remind participants that

"

- *The long versions of the Resource Sheets you have seen and the Resource Sheet* Building a Strong Parent/School Relationship *offer some suggestions for ways families can take action.*
- *If you think your child's school doesn't have good science or math programs in place, seek others who will work with you to improve the situation.*
- *Remember that a group of concerned people can be more effective calling for change than one person working alone.*

"

E. Ask participants if they have experiences or ideas to share that will help other parents take action to improve science and math programs in their children's schools. Write down the ideas on newsprint.

7. Personal Action Plan and Wrap-Up (10 minutes)

A. Pass out one copy of Handout H-2-4 *Personal Action Plan for Parents* to each person and have each fill it out on his or her own.

If there is time, ask a few participants to share one item from their action plan with the whole group.

B. Ask if anyone has questions or needs clarification on anything from this session.

C. Thank participants for coming and mention the date, time, and topic for any additional meetings you have planned.

Summary of English-Language Video:

This video explores new educational approaches that make science and math more challenging and meaningful for all students. In the first story, we visit a group of parents and children attending an after-school Family Math Program. In this program, families learn science and math together in a nonthreatening atmosphere — solving hands-on math problems using inexpensive, household materials. Through these sessions, families learn that math is fun — especially when it's connected to real-life experiences.

In the second story, we travel to Ithaca, NY, to see what science and math looks like in the classroom during regular school hours. The Alternative Community School explores new ways of teaching and learning that are producing positive educational experiences for diverse students. This is a nontrack school — where students of different abilities work side by side. Instead of memorizing dry texts, the teachers encourage students to use their reasoning and problem-solving skills. Because science and math are not separated in the real world, certain courses combine these subjects, making them challenging and relevant for the students. This school also supports open lines of communication with parents and encourages them to become involved in their children's education.

Summary of Spanish-Language Video:

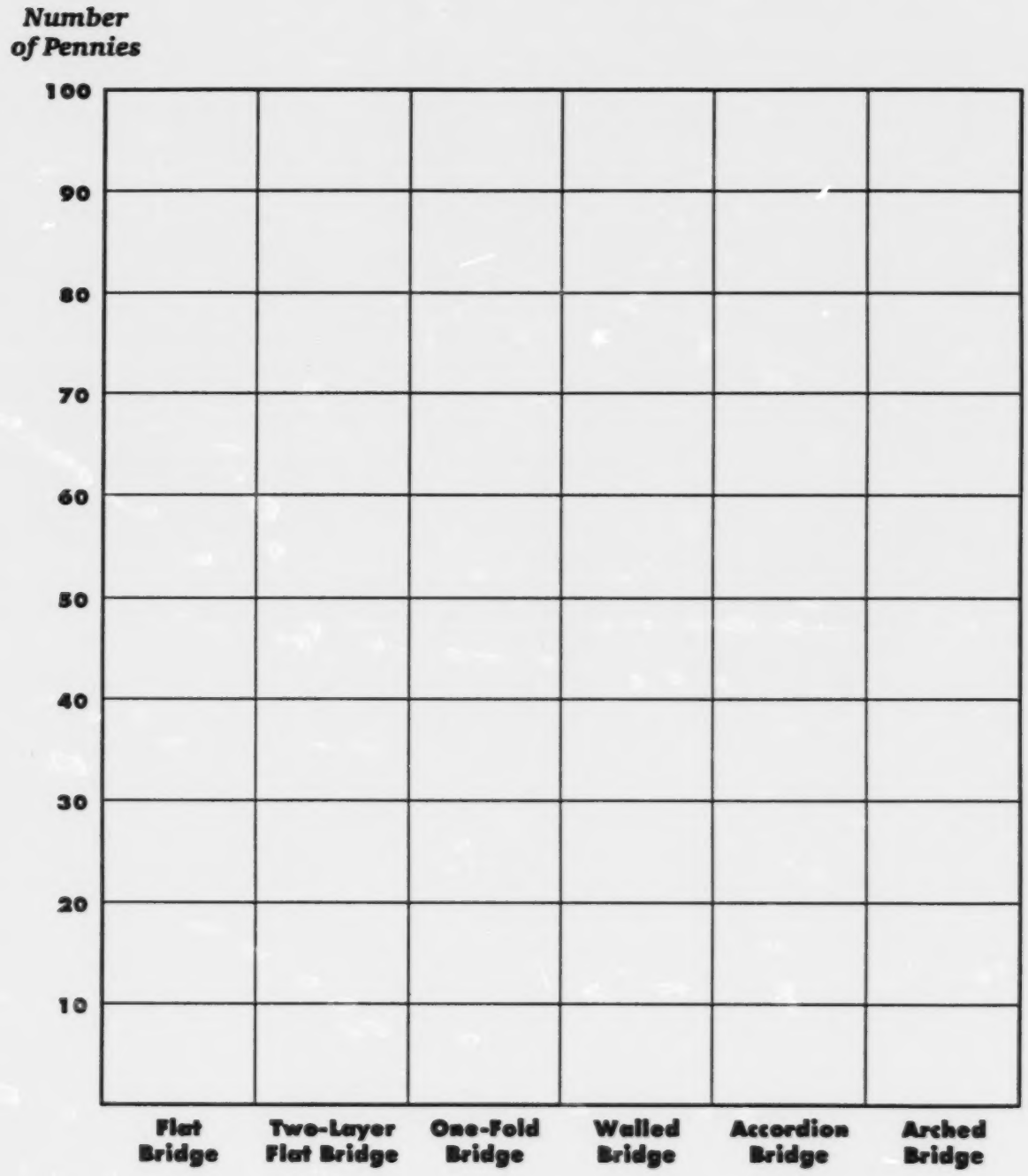
The Spanish-Language Video is a single tape that may be viewed in its entirety in this workshop. Or you may show only the first segment, which focuses on a hands-on science lesson in a bilingual elementary school classroom. This can help parents learn to recognize the characteristics of good science and math instruction so they can demand the same for their children.

Workshop leaders should preview the video. Your choice of whether to show the whole video or only the first segment will depend upon how much workshop time you wish to commit for the video activity.

First Segment:

The first segment opens with the narrator's introduction to the video and a discussion of the importance of science and math — for our children's future, our nation's future, and our everyday lives. We visit a bilingual classroom at the Fernangeles Elementary School in the Los Angeles Unified School District and watch as teacher Juan González and his fifth grade students explore the functioning of the human heart and circulatory system. This lesson is presented in Spanish to ensure that these limited-English-proficient students learn the science concepts. The lesson includes a variety of components: some direct instruction, children working in small groups with a model of the heart, students learning to measure each other's pulse, and students conducting experiments to measure lung capacity. The teacher discusses and illustrates the importance of hands-on activities, presenting concepts in the language the children best understand, working in small groups, and holding high expectations for the children. Mr. González also explains how he regularly involves parents in his students' projects, requiring that projects be reviewed and critiqued by parents at each step.

Sample Whole-Class Data Sheet



T-2-1

Construction Challenge Activity Roles

- ***Materials Manager***
  brings materials from a central location to group members; returns materials when finished

- ***Recorder/Reader***
  labels items and records the group's findings on the *Construction Challenge Data Sheet;* reads the activity rules to the group

- ***Cutter/Questioner***
  cuts the paper; asks thinking questions of the group

- ***Paper Folder***
  folds the paper to form various bridges

- ***Penny Placer***
  carefully places pennies on the bridge one by one

Good Mathematics Education Means...

- Students are active; they "do" things — measure, build, test, design, etc.
- Students use manipulatives — things they can touch such as tiles, blocks, pennies, and paper — to discover connections between numbers.
- Students are encouraged to ask a lot of questions.
- Students work in groups much of the time.
- Students learn mathematics every day.
- Activities encourage students to think by making predictions and comparisons and by solving problems.
- Tests help students to show what they do know.
- Writing, art, geography, and science are all a part of mathematics programs.
- Students make connections between mathematics and their own lives.

H-2-1

Construction Challenge Activity

Before you begin, come up with a name for your group. The name can be anything or may reflect a construction challenge the group agrees on, such as "The Calculators."

1. Each person in your group will have a role. Everyone will share the Penny Placer role.

   Materials Manager: brings the following items from the materials table to your group and returns them when finished

   - Three sheets of white paper cut in half lengthwise
   - An egg carton broken or cut in half the short way
   - Scissors
   - Ruler
   - Pennies
   - Colored stickers or Post-it™ notes

   Cutter/Questioner: cuts paper and asks questions of the group

   Paper Folder: folds the paper in a variety of ways

   Penny Placer: Everyone takes turns placing the pennies onto the bridge.

   Recorder/Reader: records the group's finding on the *Construction Challenge Data Sheet* and reads the following rules out loud to your group

"

- *The bridge can only be made from 1/2 sheet of plain white paper. Less paper may be used but not more.*
- *No glue, tape, or other materials may be used.*
- *The paper can be bent, folded, or cut in any way.*

- *The egg carton halves must be placed at least 12 centimeters, (5 inches) apart.*

"

2. Test the bridges described below. Here's what someone might see and hear as you begin your explorations:

A Flat Bridge

- ***Paper Folder:*** lays the first 1/2 sheet of paper between the egg cartons. (Review the *Construction Challenge Data Sheet* at the end of this handout to see what this bridge looks like.)
- ***Questioner:*** asks "Are the egg cartons 5 inches apart? Will this be a strong bridge? How many pennies do we think it can support?"
- ***First Penny Placer:*** tests the bridge by placing pennies, one at a time, on the middle of the bridge.
- ***Recorder:*** on the data sheet, records the number of pennies the flat bridge held.

3. Continue your investigation using the data sheet and bridge descriptions as guides. Remember, your group may come up with its own ideas for investigating the strength of bridges. Try them! Have fun!

A Two-Layer Flat Bridge: Cut the same 1/2 sheet of paper the long way down the middle to make two equal strips. Lay one strip on top of the other.

A One-Fold Bridge: Use a new 1/2 sheet of paper and fold it in half the long way. Lay it across the egg cartons to form a one-fold bridge.

A Walled Bridge: Use a fresh 1/2 sheet of paper to make a walled bridge. Fold each long side of the paper so that the bridge has walls on both sides.

An Accordion Bridge: Unfold the one-fold bridge. Use the same paper to make the accordion bridge by folding the long side of the paper back and forth. Lay it across the egg cartons to form the accordion bridge.

A More-Folds Accordion Bridge: Experiment with the number and size of the folds in the accordion bridge.

An Arched Bridge: Use two strips of paper (1/2 sheet of paper cut the long way). Create an arched bridge by placing one strip of paper between the egg cartons. (You may need to cut the strip so that the arch is the same height as the cartons.) Place the second strip of paper across the arch and egg cartons.

The *Construction Challenge Activity* was adapted with permission from *WonderScience: Fun Physical Science Activities for Children and Adults to Do Together*. ©1994. A publication of the American Chemical Society and The American Institute of Physics.

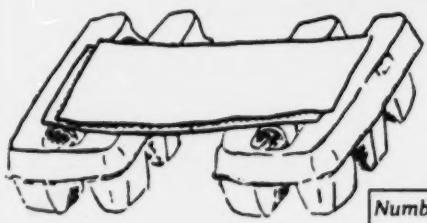
H-2-2

Construction Challenge Data Sheet

Flat Bridge

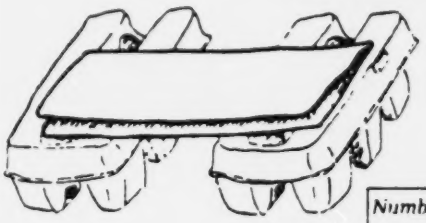
Number of Pennies

Two-Layer Flat Bridge



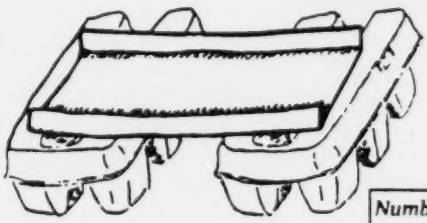
Number of Pennies

One-Fold Bridge



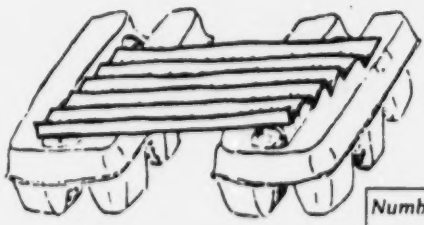
Number of Pennies

Walled Bridge



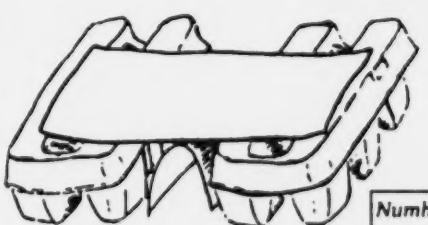
Number of Pennies

Accordion Bridge



Number of Pennies

Arched Bridge



Number of Pennies

Evaluating Your School's Science and Mathematics Programs

Examples of Action Steps for Parents

1. Talk to your child's teacher, guidance counselor, or principal and ask about the science and mathematics programs.

2. Look at the work your child brings home from school. Notice whether it is the result of rote learning or hands-on/minds-on learning.

Indicators of Rote Learning:	**Indicators of Hands-On/ Minds-On Learning:**
A photocopied worksheet out of a textbook	A product created by your child (such as a data chart)
Fill-in-the-blank or matching activities	Use of learning tools like blocks, measuring devices, etc
Copy word for word from the board	Actively doing — building, observing, designing

3. Ask your children to describe what they actually did in class. For example, did they sit and listen, read, or work alone a lot? Or did they use materials to build things and work with their classmates on science and math activities?

4. Get involved with others to work for better science and math programs for all students.

5. Use your knowledge of your community and school to decide what actions will work best in your situation.

H-2-4

Personal Action Plan for Parents

Two things I can do to promote good science and math education for my child(ren) at school:

1. _____

_____

_____

_____

_____

_____

_____

2. _____

_____

_____

_____

_____

_____

_____

D. Community Workshop: Session Three

In the Community

D. Community Workshop: Session Three

In the Community

Audience:

Parents and other members of the community, such as school and business people

Overview:

This session is designed to help parents learn more about their community and how they can increase their involvement in programs and activities that may help their children enjoy science and math. The goals of this "In the Community" session are the following:

1. Create a sense of community among workshop participants,
2. Demonstrate that more can be accomplished when people work together in a community
3. Increase parents' awareness of community-based opportunities for children to learn science and math
4. Help parents see how they can use the resources they know about in the community to increase and support their children's interest in science and math
5. Help parents learn how to become involved in or create community activities that can help their children learn science and math
6. Explore ways in which participants can get others in their community involved in science and math education

Suggested Time:

10 minutes — Welcoming
20 minutes — Getting Acquainted and Creating Awareness
30 minutes — Opportunities in My Community (includes video)
30 minutes — Taking Action: Creating Opportunities in My Community
10 minutes — Closing

About 2 hours total time

Before the Session:

1. Review "How to Gather Parents for Workshops" in this SourceBook. Use the suggestions found in that section to let parents know about this meeting/workshop.

2. **Note:** The following preparation will take a fair amount of time and research. After all of your work, you may discover that you have gathered a great deal of information or very little. Review Step 3 of "Guiding the Session" to determine how you should proceed given the amount of information you have been able to gather.

   Use Resource Sheet *Learning Science and Math in Your Community* as a guide to find some of the specific science and math opportunities that are available for the children and parents in your community. You will need this information in order to provide the parents at this meeting with a better idea of what the community has to offer and how the community can play an important role in improving their children's ability and enjoyment of science and math. You will share the information you gather with parents, or if possible, you might try to locate somebody in the community who is familiar with these opportunities. You might also consider asking a representative of an agency or an organization to present their particular program.

   The following are tips on how you might get started:

   a. Call your local Boys and Girls Clubs and ask them if they can provide you with any information regarding after-school science and math programs, science and math summer camps, etc.

   b. Call local community centers that may offer after-school programs. Ask them for information regarding the services they provide as well as the names of any other community centers in the area that might offer science and math programs (after-school programs, summer programs, etc.).

   c. Contact local museums and inquire about a science or technology museum in the area or programs offered by museums focusing on science and math. In addition, you may want to ask if they are aware of any exhibits focusing on science and math.

d. Contact the local library and inquire about science and math programs that they may offer or be aware of.

e. Contact a local church or other local religious group and inquire about any after-school programs they may offer or be aware of. One of them may also offer a summer camp program.

f. If there is a science or a math club in the area, such as at a local school, contact it and gather information about the programs it offers.

g. Contact local community colleges or universities. They may offer science and math workshops, courses, or summer programs for children or young people. Contact their outreach services to gather this information.

In contacting these community groups or organizations, ask if they can send you any literature about programs they may offer (preferably both in English and in other languages). Also make sure to inquire about the costs of any of the services they provide and include plenty of no-cost or low-cost options in the list you share with parents. In addition, ask if a representative of these groups would be interested in coming to your parent meeting and discussing their project with the parents (in a language understood by the parents).

In order to disseminate the information you have gathered regarding community-based opportunities to the parents at this session, it will be helpful to create a handout that compiles this information. This handout should include the necessary phone numbers, names, costs, location, times, services provided, etc.

3. Make arrangements for child care.

4. Review the materials list and buy or borrow any items you may need.

5. Make copies of the handouts for the number of parents you think will attend this session.

6. Set up a registration table with a sign-in sheet and name tags. Also set up a table with refreshments.

7. Arrange the room so that parents can sit at tables in groups of four.

8. Prepare a general map of the area either on a chalkboard or on a large sheet of newsprint. The map should include the area from which these parents are coming, but you only need to mark major streets and landmarks. Parents will be invited to fill in the map by marking certain locations on the map. This can be accomplished by posting or writing the names of a number of locations in the community that the parents should attempt to identify on the map. For example, a sign next to the map asks parents to identify as many of the following locations as they can:

- Where is your home on the map?
- Where are the local museums on the map?
- Where are the parks?
- Where are the local churches and synagogues?
- Where are the local community centers (such as the Urban League or National Council of La Raza affiliates)?
- Where are the local libraries?
- Where are the local colleges?

You may not want to ask parents to identify all of these places — some of these questions may not be appropriate for your area — and you might want to include others not mentioned here. Have markers or chalk handy for parents to identify these locations or have plenty of Post-its™ available so parents can write or draw the location on the paper and then stick one on the map. Clear directions should be provided.

> *Find as many of these locations on the map as possible. Identify them with a Post-it™ and the pencils/markers provided.*

Provide an example by identifying a place on the map by marking a location on the map prior to the arrival of the parents.

9. If using an overhead projector, set up and test the projector so that it is in focus and projects on a screen or wall.

10. Set up the VCR and TV monitor and test the video. Get the video set so you can press "play" and begin the tape when you need it.

Personnel and Materials:

It is recommended that the parent leader guide this session with the assistance of coleaders, although this session can be conducted alone if necessary. The following materials are needed in this session:

- Name tags
- Sign-in sheet
- Resource Sheet *Learning Science and Math in Your Community* (one copy for each person)
- *How Many Can You Answer?* (H-3-1) (one copy for each person)
- *Personal Action Plan for Parents* (H-3-2) (one copy for each person)
- Copies of parent phone number list if available
- Refreshments
- Overhead projector (if available)
- VCR, TV monitor, and videotape
- Newsprint, markers, and masking tape

Guiding the Session:

1. Welcoming (10 minutes)

Greet parents as they arrive and have them sign the sign-in sheet and fill out a name tag. Direct children to the child care room you have provided. Invite parents to enjoy the refreshments and to explore the community map you have prepared while the group is gathering. Guide parents, if necessary, to the map and model the exercise by plotting the location in which the parent meeting is being held to start parents off.

2. Getting Acquainted and Creating Awareness (20 minutes)

A. Welcome the entire group and introduce yourself and any other project staff to the group.

B. Begin this session by quickly reviewing some of the important points about your local parent program and state what the goal of this session will be. You may want to say the following:

"

- *One of the main goals of this parent program is to help parents help their children do well and enjoy science and math education.*
- *Parents have many opportunities to promote science and math at home and at school — the community offers another opportunity to help our children with science and math. In particular, we want to discover the opportunities that exist in our community and how we can access them.*
- *In this session, we will also try to understand how parents can get involved in community efforts to promote science and math education. This could mean becoming involved in efforts that already exist or creating new opportunities to promote science and math education in our community*

"

C. Next, tell the group that before beginning to explore ways in which they can get involved in community efforts to promote science and math, they should begin to think about what a community is and reasons why it might be important to be part of a community.

"

What is a community?

What are the benefits of being part of a community?

Why is the community important?

"

You may want to write down the responses to these questions on newsprint.

Prompt parents to define community as something that not only refers to the child's home neighborhood or the school neighborhood but also includes the wider local community of people from business, civic (parks), cultural (museums), religious (church), and other organizations and agencies that influence children's learning.

D. After the participants have had time to consider the responses offered, tell them that they will now do a quick activity that demonstrates the idea of a community.

E. Pass out one copy of Handout H-3-1 *How Many Can You Answer?* to each person. Share the following instructions with participants:

"

- *You have all been given a handout that says* How Many Can You Answer? *on the top. This is a difficult worksheet filled with trivial science- and math-related questions. It will be difficult to complete alone but take two minutes to try to answer as many of the questions as you can.*
- *Now, move across the room and find a partner (try to pair up with someone you haven't had the opportunity to meet yet), introduce yourself, and then see how many of the answers you can come up with together. Share and discuss answers that you have with your partner. After you have done this, chances are you still haven't been able to complete the worksheet or are uncertain about some of your answers.*
- *After you have come up with responses with your partner and have shared answers, continue pairing up forming larger groups. Again, introduce yourselves to the other group members and then continue to share answers or try to find answers for questions you have not been able to answer.*

"

While the participants are trying to complete the worksheet, you may want to make sure that they keep forming larger groups and suggest that they form one large group to make sure that they all have the same responses. The group may do this on its own and may not need the suggestion.

F. When all the participants have completed the worksheet, review the answers. Although the group may have come up with all of the correct responses themselves, answers are provided (T-3-1). Allow the group to respond as a whole to the questions. After reviewing the answers, point out to the group that they were able to complete the entire worksheet by working together as a community. You might tell them, "As an individual, working alone, it was probably difficult to answer all of the questions, and it was impossible to be sure you had the right answers, but by working together, everybody was able to get all of the answers." Share the following information with the participants.

> *"This worksheet demonstrated how much we can learn by working together as a community. We were able to complete the task, and it became much more enjoyable. Science and math are activities that our children can enjoy and excel in if they know that they do not need to complete the task alone or without help. There are people in the school and at home who are available to help, and there are opportunities to get help in our community. We are here to learn about these opportunities that exist in our community."*

3. Opportunities in My Community: An Activity for Parents (30 minutes)

It is now time for parents to learn about the science and math opportunities that exist for their children in their community.

A. Explain that this part of the workshop will help the group to begin thinking about opportunities that exist or might be created in their community to help their children learn science and math.

B. You may choose between two videos at this point in the workshop. Both the English language video and the Spanish language video give visual examples of places and ways children can learn science and math in their communities. Preview the video that you plan to show if you can. Or you may read a short description of each of the videos, found on pages 14 and 15 of this workshop. Your choice of which one to use will depend upon your audience. You may wish to describe in a few sentences what the video is about.

We will begin by viewing a video. As you watch it, ask yourself these questions:

- *Can you think of programs in your community which would provide an opportunity for your children to expand their knowledge of science and math?*
- *If your town does not offer science/math community programs, do you have any ideas for projects that you and other parents can create that will enrich your children's understanding of science and math?*

Play the video.

After watching the video, ask the group for any comments or questions.

Then tell the group members that they will now focus on opportunities in their own community.

C. Refer to the map that the parents added to as they came in and tell parents that they have already located a few of the opportunities (based on the markers they placed on the map). At this point, you want to share more detailed information with them.

D. To conduct this part of the session, you have a number of options:

- Present the information you were able to gather by contacting local organizations and agencies in the community. Distribute materials that you prepared or were able to collect from these programs and explain how parents can tap into these resources. For example, make sure that parents know where the Parks and Recreation Office is located and who they would contact in order to sign their children up for any after-school science and math programs it might offer. Use the map from the opening activity to orient parents to the locations of other programs. To represent these locations, add some buildings made of construction paper to the map or draw them in.

OR

- If you have invited a few representatives from agencies or organizations to the meeting, introduce these individuals to the group. Give these representatives a few minutes to provide the parents with information regarding their agencies' programs and to distribute or display any materials they may have brought with them. After they have completed their presentations, make sure that you follow up by talking about other opportunities that may exist in the community that you have discovered while gathering information. Always include a question and answer period. Distribute materials you have prepared or have gathered from these organizations. Provide parents with all the necessary information they will need to get their children involved in these programs.

OR

- If you were able to locate many representatives from agencies or organizations from the community and to invite them to the meeting, set up an exhibit or an "Opportunity Fair." Allow parents to roam the exhibit and speak to representatives from these organizations regarding the programs they offer. Make sure that every parent gets the necessary information and that you distribute materials that you have prepared compiling this information. Make sure to leave enough time to discuss additional opportunities not presented at the fair. In addition, reserve time to field questions that the parents may have about the represented programs or programs that were not a part of the exhibit.

OR

- If you were unable to find many opportunities in your community and do not have a great deal of information to share with the participants, ask the parents to assist in finding these opportunities.

Divide parents into groups of four and distribute the Resource Sheet *Learning Science and Math in Your Community*, newsprint, and markers to each group.

> *This Resource Sheet will serve as a guide to the types of opportunities that may exist in our community. Each group should brainstorm science and math opportunities that exist for the children in our community. After a few minutes, we will share some of our ideas.*

When the groups have completed the brainstorming session, ask a member from each group to present the opportunities they have uncovered to the rest of the group. You may want to encourage parents to make some phone calls to check further on opportunities and report to the group at a later time.

Extension Activity: *Extend this activity to include a visit to the local science museum, college, and any other place that might have established science and math programs in the community. This would allow parents the chance to become familiar with the program and learn firsthand how these programs could benefit their child or children.*

4. Creating Opportunities in My Community: An Activity for Parents (30 minutes)

Parents may have noticed that although a number of opportunities exist in their community to improve and develop their children's interest in science and math, many more opportunities could be in place. Ask parents if they can think of any existing opportunities that they know about that were not mentioned today. (Make sure to write these down so that parents can copy this information.) Next, challenge parents to develop and design a community-based science or math project. Invite parents to meet this challenge by providing them with the following information and instruction:

"

- *Up to this point we have discussed and explored established science and math opportunities that are sponsored by clubs, religious groups, museums, parks, community centers, etc. But do these established programs offer the only opportunities to tap into to improve the science and math education of our children? NO. Together, as parents, we can create science and math activities that utilize the community. Are there any ideas? (Note these on newsprint.)*

- *There are plenty of opportunities — the key is to view the community as a science and math playground or laboratory of sorts. For example, a group of parents could design a community garden project if they had information about the nurseries and parks in the community. A garden project not only would*

involve science — learning about different plants and how they grow — but also would entail the use of math. If we had a very small plot, for example five feet by five feet, and wanted to grow five different kinds of plants or flowers, how much planting room could we give each kind of plant? Or what if we planted vegetables and decided to sell the vegetables. How much should we sell them for? This is just one idea that involves using the community and community resources to demonstrate to children that their community is a place that uses science and math and that it is a place to learn about and enjoy science and math.

- *In groups of four, try to create a science and math program that uses the community as a science and math playground or laboratory. Think of the shops or businesses you are familiar with and how they use science and math (for example, recycling center, the bakery, a restaurant). Could any of these be developed into an activity that could foster children's interest in science and math?*

- *Write down your activity on the newsprint and make sure to include information regarding how you would organize the project, how you would provide adult supervision for the activity, how you would include science and math in the activity, and how much the project would cost.*

"

Provide the groups with markers and enough newsprint to record all of their ideas. Upon completion of this task, each group should tape its newsprint on a wall or board. Provide parents with enough time to roam the room and view the science and math activities the other groups have come up with. If there is enough time, allow a person from each group to present the science and math activity to the rest of the parents.

Before proceeding, point out that science and math surround us in our everyday life in our community. By parents pointing this out to their children, they can help them to begin to explore and appreciate science and math in the community.

Extension Activity: *This activity could be extended to include outdoor field trips. Allow each group to explore the community and discover science and math down the street, at the park, at the local restaurant, etc.*

5. Closing: Action Plan and Wrap Up (10 minutes)

A. Distribute one copy of Handout H-3-2 *Personal Action Plan for Parents* to each person. Ask parents to think about the many opportunities the community offers to help their children enjoy and learn science and math and to be successful in these subjects. Ask parents to fill out the *Personal Action Plan* as you make some closing remarks.

B. Provide some closing remarks:

"

- *We have learned that we can gain a great deal by working together and by being a member of a community. Being a member of a community offers us a chance to learn from other individuals. In particular, we learned that our community provides a number of established opportunities for our children to succeed in science and math (parks and recreation programs, museum programs, summer camps, etc.).*
- *We also learned that we, as parents, can use the community as a science and math laboratory. Science and math fill our environment and we can use the community (the local bakery, parks, recycling center, etc.) to create our own science and math activities.*
- *Think of all these opportunities as you fill out your* Personal Action Plan. *You may decide that the one thing you can do in the community for your child is to sign him/her up for an after-school program or science and math summer camp. You can try to organize a science and math activity using community resources, or you might decide to assist in a community project and help your child as well as other children in the community to learn and appreciate science and math.*

"

If time permits, allow a few parents to share their *Personal Action Plans* or have parents post them so other parents can view them.

C. Ask if anyone has questions or needs clarification on anything from this session.

D. Thank participants for coming and mention the date, time, and topic for any additional meetings you have planned.

Summary of English-Language Video:

This video presents two stories of science/math community programs that have enriched the lives of children and their families. In the first story, which takes place in the inner city, we meet Mrs. Reagan, who has encouraged her teenage son LaRae to become involved in the Green Teen's environmental internship program at a local children's museum. While having fun, the teenagers learn to be conscientious citizens and contribute to a cleaner environment. Through this program, LaRae has met many other students, increased his problem-solving and communication skills, and expanded his knowledge of science.

Although there are science/math programs in many large cities, in some smaller communities, there are few opportunities to learn science and math outside school. That's why parents, children, and community members decided to build a local science Exploration Station in rural New Mexico. In this second story, we visit the Exploration Station with its wonderful array of hands-on activities and see families enjoying science and math projects together.

Summary of Spanish-Language Video:

The Spanish-Language Video is a single tape that may be viewed in its entirety in this workshop. Or you may show only the second segment, which shows parents working together at a community center to learn more about science and math resources in the community. The parents are also practicing simple activities they can do at home with their children to motivate interest in science and math.

Workshop leaders should preview the video. Your choice of whether to show the whole video or only the second segment will depend upon how much workshop time you wish to commit for the video activity.

Second Segment:

This segment illustrates the ways that parents can work together to learn more about how to help their children excel in science and math. These parents have gathered at the Youth Center at El Centro de Servicios Sociales, in Lorain, Ohio, for a Saturday parent workshop. Parents are shown building a three-dimensional model of their neighborhood as they explore what local resources they can use to expose their children to science and math. They also practice several activities — using everyday household materials — that they can do at home with their children to help spark their children's curiosity about science and math. As coordinator Crucita Marrero explains, community-based organizations may not be experts in science and math, but they are expert in bringing families together with community resources and with those people who are skilled in science and math education.

H-3-1

How Many Can You Answer?

Directions: Answer as many of the following science and math trivia questions as you can. After a few minutes, pair up with someone and try to answer a few more. Share responses and discuss possible answers. Continue pairing up to form larger groups until you are able to answer all 20 questions.

1. How many legs does a spider have?
2. How many sides are there to a hexagon?
3. Name the three primary colors.
4. What is the shape of a YIELD sign?
5. Does an orange with its peel intact sink or float?
6. The circumference of your fist is equal to the length of what part of your body?
7. Which freezes faster, hot or cold water?
8. What is the shape of a STOP sign?
9. Where do raisins come from?
10. In the United States, does water go down the drain clockwise or counterclockwise?
11. True or False: A person goes to bed at night shorter in height than he/she measured upon waking up in the morning.
12. Where does cinnamon come from?
13. How does a dog sweat?
14. List the five senses.
15. Is a tomato a fruit or a vegetable?
16. Which is the planet farthest from the sun?
17. Name six types of natural disasters.
18. Where does leather come from?
19. What is the longest bone in the human body?
20. What two colors make purple?

86

T-3-1

Answer Key

How many can you answer?

1. How many legs does a spider have? *eight*
2. How many sides are there to a hexagon? *six*
3. Name the three primary colors. *red, blue, yellow*
4. What is the shape of a YIELD sign? *triangle*
5. Does an orange with its peel intact sink or float? *float*
6. The circumference of your fist is equal to the length of what part of your body? *foot*
7. Which freezes faster, hot or cold water? *hot*
8. What is the shape of a STOP sign? *octagon*
9. Where do raisins come from? *grapes*
10. In the United States, does water go down the drain clockwise or counterclockwise? *clockwise*
11. True or False: A person goes to bed at night shorter in height than he/she measured upon waking up in the morning. *true*
12. Where does cinnamon come from? *bark of a tree*
13. How does a dog sweat? *mostly through its tongue*
14. List the five senses: *touch, sight, hearing, taste, smell*
15. Is a tomato a fruit or a vegetable? *fruit (scientific); vegetable (U.S. government)*
16. Which is the planet farthest from the sun? *Pluto (or sometimes Neptune)*
17. Name six types of natural disasters. *wildfire, earthquake, blizzard, hurricane, landslide, drought, flood, tornado, volcanic eruption*
18. Where does leather come from? *hide from an animal*
19. What is the longest bone in the human body? *thigh bone (femur)*
20. What two colors make purple? *blue and red*

H-3-2

Personal Action Plan for Parents

Two opportunities in our community that can help my child(ren) be successful in science and math:

1. _____

_____

_____

_____

_____

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2. _____

_____

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88

III. Resources

III. Resources

The purpose of the SourceBook is to encourage parents and community activists who want to start activities that enhance science and math education. This section provides examples of programs that have already been started, and hopefully, these will inspire people who are trying to figure out how and where to begin.

In cities and towns throughout the country, there are programs that are already up and running. In the Project PRISM Database, one hundred of these programs and resources are described, including brief summaries and contact names and/or addresses. Information about the programs described in this section as well as other programs can be obtained by calling 1-800-836-6734 or by writing to PROJECT PRISM, National Urban League, Inc., 500 East 62nd Street, New York, NY 10021.

The programs and materials included here demonstrate that reform efforts can come in many different ways and in many different forms. Some of the programs have been sponsored by large corporations or universities, and others were started by single individuals who, through their enormous commitment, keep things going from year to year. Some programs are national in scope with local sites in several states, and others take place in just one neighborhood and involve little or no cost. Some programs have been in existence for years, and others are just getting started. Some of the programs listed here are in fact reference materials for ongoing programs, and others are how-to guides to help people develop other programs.

What all the programs have in common is that they were initiated and are now sustained by people who care a lot about the future of the children in their communities. They are people who are concerned with the quality of their family and community life and who are committed to providing children with access to educational opportunities. By doing what they are doing, these people are helping to build a more solid future for the children in their communities and a more solid foundation for the future of the country.

Examples of National Programs:

The following programs were developed by national organizations for dissemination in local communities.

Family Math — a program to help parents understand and be comfortable with contemporary math skills.
For information call: 510-642-1823

Operation SMART — an initiative undertaken by Girls, Inc., to encourage girls' interest in math, science, and technology.
For information call: 212-689-3700

Examples of Museum Programs:

The following programs have been developed by community-based museums. Each one is designed to enhance the science and/or math skills of participants.

Science Club Network — a network of neighborhood science programs that draw on the resources of Chicago's Museum of Science and Industry.
For information call: 312-684-1414, ext. 2421

Explainer Program — a program in which teenagers work as guides at the Exploratorium in San Francisco.
For information call: 415-561-0342, High Scool Explainer Program

Youth Volunteer Program — a program at the Denver Museum of Natural History to help children become more scientifically literate and to expose them to science careers.
For information call: 303-370-8343, Youth Volunteer Program

Family Workshops — an opportunity for families to undertake science projects together at Impression 5 Science Museum in Lansing, Michigan.
For information call: 517-485-8116, Family Workshops

Examples of What One Person Can Do:

There are programs in neighborhoods all around the country that were started by individuals who had a vision and had the energy to turn that vision into reality. The enthusiasm that these people have for their programs is highly contagious!

KIDS — a bilingual science curriculum and summer program for Hispanic children developed by a university professor in Irvine, California.

The Brainy Bunch — a program started by a parent in her kitchen that has grown to three classes and a meeting place to experience hands-on science in Grand Forks, North Dakota.

The Mission Science Workshop — an after-school, drop-in program in the Mission District of San Francisco, started by a technician in the Engineering Department of City College of San Francisco.

Entomology — a summer program for elementary school girls to learn about insects, started by an entomologist in Florence, South Carolina.

Positive Alternatives Project — math and other subjects are taught to children in a neighborhood police station on the West Side of Chicago.

Examples of Efforts to Enhance the Home-School Partnership:

Materials have been developed and programs have been started that are geared toward helping parents and schools form constructive partnerships in the task of educating children. Some of these efforts are focused on specific communities and others were developed to help parents and schools throughout the country.

Taking Stock — provides tools for schools and communities to use to assess the strengths and weaknesses that exist in their relationships.

What Students Need to Know — a how-to manual for parents and others interested in improving collaboration among schools, communities, and families.

Parent Kits — developed by the Denali Elementary School in Fairmount, Alaska; they offer hands-on math and science activities for parents to work on with their children.

Building Home-School Partnerships with America's Changing Families — an instructional kit, developed at Wheelock College, for parents, teachers, administrators, and others to help build good home-school relationships.

Playtime Is Science — a science activity program that is being disseminated nationwide for parents, their children, and the schools, providing suggestions for hands-on activities that can be done at home.

Examples of Materials for Parents:

There are increasing numbers of books, videos, and other materials that are designed for parents to use with their children. Many of these suggest activities that are simple to do at home and provide learning experiences that can be shared by parents and children.

Math Matters — developed by the national PTA in both English and Spanish, this math kit includes a video, a brochure, an instruction guide, and suggested activities for parents and elementary school children.

Teach Your Child Math — a book for parents and children of simple and interesting math projects that teach concepts and principles by playing games.

Teach Your Child Science — a book of easy-to-do science projects that demonstrate various scientific concepts through hands-on experiments.

Examples of Materials for Community Groups:

When groups in the community want to get something started for the children, there are lots of different resources they can draw on. Some give step-by-step instructions on how to get a program up and running and how to get families involved, others list existing programs throughout the country, and others provide materials that organizations can use to prepare for new programs.

Expanding Your Horizons — a handbook for community leaders who want to set up conferences or workshops to encourage girls to pursue math and science careers.

Directory of Outreach Programs — an easy-to-use resource book that provides information about science programs for children throughout the country.

Action Kits — materials developed by Children's Television Workshop for community organizations to help children learn science through activities.

Volunteers Teaching Children (VINE) — a step-by-step guide developed by a neighborhood ecology network in Denver to help adults start community science and ecology programs.

This very brief listing is just a starting point. There are many more programs and many more resources for parents and community groups to draw upon. Indeed, many local libraries carry magazines that are geared to teaching children, from preschool through high school, about math, science, and technology. Examples include *Kids Discover, Owl, Popular Science, Ranger Rick, Discover, Chickadee, 3-2-1 Contact,* and *WonderScience*. Librarians can also point out other helpful reference materials.

Many program directors will happily share information and experiences with people who are trying to get something started in their own communities. As noted at the outset, the Project PRISM Database includes contact names, addresses, and phone numbers. There are programs throughout the country that enhance math and science education. Now it's time to learn more about them and to see what might work in your own community, and maybe now it's time to get something started for your own children.

IV. Bibliography

IV. Bibliography

This bibliography serves two purposes. The first is to identify some of the key research documents that are the basis for the content of the Resource Sheets and the SourceBook. The second is to provide references for those who would like to read and delve more deeply

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Organizations Invloved in Science and Mathematics Education Reform

The following organizations can provide information on reform efforts and new standards being developed to reshape mathematics and science education.

American Association for the Advancement of Science
Project 2061
1333 H Street, NW
Washington, D.C. 20005

Mathematical Sciences Education Board
National Research Council
2101 Constitution Avenue, NW
HA 476
Washington, DC 20418

National Council of Teachers of Mathematics
1906 Association Drive
Reston, VA 22091

National Science Teachers Association
1742 Connecticut Avenue, NW
Washington, D.C. 20009

Quality Education for Minorities
1818 N Street, NW
Suite 350
Washington, D.C. 20036

Triangle Coalition for Science and Technology Education
A Guide for Building an Alliance for Science, Mathematics and Technology Education
5112 Berwyn Road
College Park, MD 20740